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Sustainability and Cement - is it possible or not?

The Swedish cement industry and conflicts in environmental issues

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Introduction

In this case we will look at the cement industry and sustainability issues. The Swedish cement industry will be used as example in order to show how the industry have developed. Special attention will be given to the concentration process where the Swedish cement industry ended up in a monopoly in the 1970s. Focus is on the role of the Swedish government in this affair, the role of the state is also important for the environmental issues and sustainability questions that the industry have had to tackle. The Swedish cement industry have been part of several conflicts regarding environmental issues, three of these conflicts are presented together with an account of how the industry have taken on sustainability and included it in their communication.

Cement production

Cement has a wide range of usage and are used in all parts of the construction sector. The main usage is in concrete. Cement is a binding powder that is mixed with water and ballast (sand and/or crushed rock) on the work sites, it can also be transported to the construction sites in cement mixer/concrete trucks. The concrete hardens after the mixing, and it is a material that can stand for a long time. Today, there is not material that can replace concrete in foundations of buildings and in constructions that need to be especially strong and to stand against heavy loads and hard weather, for example bridges.

Cement and concrete are also used in many other building materials, such as building elements, concrete pipes, and different tiling. The cement industry was in the 20th century very good at promoting and finding new usage of cement and concrete, as for example building roads and parking lots in concrete. Concrete is very popular as building material and the price is rather low-priced compared to some other materials.

The product cement is made out of limestone and clay as abasis, small amounts of gypsium and sand are included in the grinding process. Other substances can be added to give the cement/concrete specific features. It is also possible to blend in waste materials from other industries, such as blast furnace slag from the steel production. Most cement factories are located close to the raw material, limestone. Limestone is quarried in open large quarries, the limestone quarries in themselves create large craters in the landscape. The location of the quarries could conflict with natural and social values, we will further on see some



examples of this from the Swedish example. The limestone is transported by trucks and/or conveyer belts to the factory, where it is burnt in large kilns and thereafter grinded. The kilns are rotating, and the size have increased successively and could today be 150 meters. To set off the chemical process, calcination, the temperature needs to be 1450 degrees. To get the kilns up to that temperature a lot of energy is used and the material that is used for burning needs to have a high energy content. In the early days coal was used, then the industry moved on to oil, but after the speeding oil prices in 1970s many European cement factories went back to using coal as the main energy source. In later years there have been different attempts to use other sources, for example renewable energy and burning waste products – which we also will see an example of further on.

The cement industry has been good at taking use of the advantages of *scale and scope*¹. Even though the product is basically the same as in the 19th century, there have been extensive development in the production and in the distribution process. The cement factories often started out as a local project, with investors from the surrounding area. During the decades the factories grew, and similar production lines were included in the factories, many times using waste material from the cement production. As stated before, the kilns require considerable energy supply and the whole process is very capital intense hence the factory need to be kept going as much as possible. While the construction sector is cyclical that puts pressure on the industry, the solution is to export the overproduction. When the cement factories are located close to sea or other waterways that is a solid option. Even though cement is very heavy and bulky to transport, the sea transport made it easy to transport cement to other parts of the world already in the late 19th century.

Due to the capital intensity the cement industry is keen to keep competitors out of the market. The barriers to entry are high due to the capital and specifics required to set up a cement factory. While the size of the factories increased during the 20th century that also meant that the barriers against entry became even harder to pass. The cement producers often kept together on a national level and domestic *cartels*² in the cement industry could be regarded as more the rule than the exception. To control the domestic market meant that the producers could have a stable output, but there were also many attempts to control the exports. Cement producers frequently set up agreements about respecting each other's home markets, so called *gentlemen's agreements*. In the 1930s and 1940s the European cement producers formed cartels to organise the export of cement to the world market. After World War II several new actors entered the cement industry (Japan, Soviet etcetera) and many countries that before had been dependent on cement import set up their own factories.

Table 1. Largest cement companies in the world 2020, production and capacity in million tonnes per year.

	Company	Production	Capacity	Country of origin
1	LafargeHolcim	287	387	Switzerland
2	Anhui Conch Cement	217	288	China
3	CNBM	176	406	China
4	Heidelberg Cement	121	129	Germany

¹ Scale – advantages given by producing in larger units and volumes. Scope – advantages given by adding variety in the production.

² Agreements to limit the competition by, for example, dividing markets, set the prices or share technology.



5	Cemex	87	93	Mexico
6	Italcementi	77	77	Italy
7	China Resources Cement	71	78	China
8	Taiwan Cement	63	69	Taiwan
9	Eurocement	45	50	Russia
10	Votorantim Group	45	54	Brazil

Source: <https://blog.bizvibe.com/blog/top-10-cement-companies-world>

The concentration process continued on the national level during the 20th century, but also increased on the international level. The European cement companies had set up factories in other parts of the world and bought cement companies in other countries. The cement companies continued to grow into multinational companies. In the last decades there have been many large mergers and acquisitions in the cement industry, today most of the cement is produced by large multinational corporations. Table 1 shows the largest cement producers of 2020.

The Swedish cement industry

The Swedish cement industry was established in late 19th century. The demand for cement came out of the rapid industrialisation process and the development of the agricultural sector in Sweden. The first cement factory was established in southern Sweden in the 1870s. In the 1890s two other cement factories had been established in Sweden and the cement companies decided to cooperate. They set up a cartel and joint sales company, Cementa. Cementa more or less controlled the Swedish cement industry during the 20th century. *The first mover*³ on the Swedish market, Skånska Cement, merged with or acquired the competitors one by one and in 1966 Skånska Cement had taken over all the other members in the joint sales company, Cementa. Skånska Cement then took on the name: Cementa. In the beginning of the 1970s there were only one competing cement producer left of the Swedish market, Gullhøgen. Both Cementa and Gullhøgen were *vertically integrated*⁴ into other parts of the construction industry, such as the plasterboards, concrete products, and other building materials.

The demand for cement had declined since the industry had been hit by the effects of the oil crisis in beginning of the 1970s and due to a change in the orientation of housing, where smaller houses with more tree materials had increased. The owners of Gullhøgen, Industrivärden, decided that they wanted to sell the company, but the state had an interest in Gullhøgen through state-governed companies the state owned a small part of Gullhøgen. The Minister of Industry, Rune Johansson, in Sweden became aware of the prospects and became involved in the organization of the cement industry. After many turns and negotiations, the result was that Cementa took over Gullhøgen, and that the state became a minority owner in Cementa. Through the acquisition Cementa gained a monopoly over the Swedish cement market, and therefore it was a controversial issue. The affair was finalized in 1974, Cementa agreed to keep to several stipulations, especially concerning the state being able to monitor the development in the industry. One of the arguments for the acquisition was the possibility for rationalisation and shortly after the overtake Cementa started an

³ The first actor on the market, that receives benefits from being first.

⁴ The company includes other parts of the production chain in their company, for example raw material (backwards) or marketing (forward).



investigation that suggested fewer factories and that all the factories should move from wet production to the dry production method. The dry production method demanded less energy since the material inserted in the kilns was dry.

In the late 1970s and beginning of the 1980s Cementa also shut down several factories and only three remained (the factory on Öland then closed in 2019). The decision was made to focus on one of the factories and that was the factory in Slite, Gotland. The reason was that the factory had great opportunities for transporting the cement by sea, the factory was located close to the harbour and located in the middle of the Baltic Sea, and there were great resources of limestone available. In the 1980s and 1990s Cementa followed the stipulations, they checked with the authorities when they wanted to raise the prices and when the industry made changes, they considered how it would affect the local society. That was also the reason for why the smaller factories in Skövde and on Öland was kept in production, the factory in Slite could actually produce all the cement that was demanded by the Swedish market. The factory in Slite have been enlarged and new kilns have been built over the years, but the factory remains in the same place and have a capacity of producing more than 2,5 million tonne cement per year.⁵

In the beginning of the 1990s there was a new era in Swedish politics and the Swedish parliament decided to privatize several state-owned companies and/or to sell of the shares that the state owned. Cementa was one of the companies that was privatized. After the government and the authorities did not give much attention to the cement industry, it was an industry that was functioning and there were no large structural changes in the industry.

The cement production in other countries had been through similar concentration processes as the Swedish industry. The cement plants had grown in size, and many of the international cement producers had developed into multinational companies and conglomerates with production on several continents. The Nordic cement producers had a tradition of cooperation⁶, and in 1994 the Swedish cement construction company Euroc, that Cementa was affiliated to, merged with the Finnish cement company Partek/Metra. In 1999 the whole company was acquired by HeidelbergCement (a multinational cement producer). Cementa is today an affiliated company to HeidelbergCement. In 2021 the Swedish government became aware of some of the restrictions and specifics that the concentration of the production, the monopoly, and the foreign ownership had for the cement industry. But first, we will take a look at how the cement industry have handled the sustainability and environmental issues over the years.

The cement industry and the environmental issues

The sustainability issue is the main problems for the cement industry to solve. The production of cement has an impact on the environment in several different ways: pollution, carbon dioxide emissions, restrains on the ground water, noise and emission from transportation, encroachment on sensitive nature (including protected and endangered species).

Reduction of carbon dioxide emissions is essential for stopping the climate change. The cement industry is one of the industries with large emissions. The Swedish cement industry is responsible for 15 percent of the total industry emissions in Sweden.⁷ One way of restricting the carbon dioxide emission is the European Union Emissions Trading System, where emission rights are handed out and companies that have higher

⁵ <https://www.cementa.se/sv/slite>

⁶ Dahlström (2020)

⁷ Karlsson, Toktarova, Rootzén and Odenberger (2020), p. 7



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emissions can by rights from others that have lower emissions. But so far the cement industry have been given free emission rights, therefor it has not affected the industry. The table below shows the companies with the largest emissions in Sweden 2019 and 2020, the table shows that the three largest polluters are connected to products much discussed in relation to sustainability; steel, cement and oil.



Table 2. Companies with the largest carbon dioxide emissions in Sweden. 2019 and 2020 in million tonnes.

	Company	2019	2020	Product
1	SSAB	5,23	4,52	steel
2	Cementa	2,02	1,9	cement
3	Preem	1,68	1,53	oilproducts
4	LKAB	0,67	0,65	ironmetals
5	Borealis Krackeranläggningen	0,63	0,61	chemical
6	Nordkalk etc.	0,6	0,61	lime
7	Stockholm Exergi	0,7	0,38	electricity, waste, coal
8	ST1	0,46	0,5	oilproducts
9	Boliden Rönnskärsverken	0,27	0,28	metalproducts
10	Gärstadverket Linköping	0,26	0,27	electricity, heating
11	SYSAV	0,25	0,24	electricity, heating

Source: <https://www.sverigesnatur.org/aktuellt/de-slappte-ut-mest-koldioxid-2020/>

The limestone quarries have a big impact on the surrounding environment, despite that it was very easy to open a limestone quarry during the 19th and 20th century. It was almost as simple as buying the land and start the quarry. To set up a cement factory demanded some permission, but that had not been a problem since most municipalities and regions welcomed the localisation of new industries. The limestone quarries and cement factories were often located in rural or semi-rural areas where there were not many other job opportunities. This positive attitude changed in the last decades of the 20th century when the awareness of environmental issues grew. The higher demands on the productions and the quarrying in the last decades of the 20th century also changed the way that the boards of the cement companies had to deal with the issues. In the 1970s and the following decades discussions regarding new and enlarged quarries for limestone and the emissions became debated in public. This was a new situation for the cement industry that had a long history of being an integrated and essential part of the community and seldom questioned.

Environmental legislation in Sweden

The care for the environment was not a big political issue until the second half of the 20th century. Around 1900 the nature and the surroundings became of more interest for the Swedish people. People interested in safeguard of nature joined and started organizations for protection of the nature. In the second half of the 20th century, the interest in nature and the environment also included the politicians, and in 1952 the first law for nature protection was enforced. During the 1960s and 1970s several new laws followed. The laws did not primarily focus on the industrial activities or on diminishing the emissions; the aim was to protect certain areas from exploitation and to change the behaviour of the population.

In the 1980s new laws regulated health, chemicals, how natural resources could be extracted, planning and construction processes etcetera. In the beginning of the 1990s the laws regarding the environment were combined in one major law, The Swedish Environmental Code (Miljöbalken). The regulations in the new law were more ambitious and changed the way that companies were working with permissions and planning. One major shift was that industries had to take sustainability into their discussions and relate to issues regarding sustainability in their activities.

For quarrying and processing limestone, an environmental permission is needed and most often a water permission. The process for getting these permissions is extensive: before an application can be handed in



the company must have done some investigations regarding the consequences, for example consultations with the neighbors and stakeholders must have been completed. One of the most important things for the companies to do is an environmental impact assessment report. In that report all aspects of how the quarrying will affect the environment and the ground water, natural values, the effects for the neighborhood, noise and dust etcetera have to be calculated. The application is handed to the specific environmental courts and the permission is possible to appeal to the next court. Since the issues are complex often several permissions are needed, and the process could therefore take many years.

Corporate Social Responsibility

Today many companies have integrated sustainability into their businesses and all firms are expected to have a strategy for their Corporate Social Responsibility (CSR). The modern discussion about the individual firms' Corporate Social Responsibility was formalized and spread in the 1950s and 1960s. At that time, the focus was on how companies should act in relation to social failures. Some argued that the only responsibility of firms was to maximize shareholders' profits others that firms had responsibility for their workers and everything that their products created (use of resources, emissions etcetera). Social movements had started to grow, and they tried to influence companies to take responsibility for their activities. Some corporations also started to integrate CSR in their activities, but it was not a process that affected all parts of the company, often it was a limited policy.⁸ There is still a lot of insecurity about what kind of results a firm can expect with an active CSR work. The reason for companies to take on CSR can be that it is just unthinkable to not take it on, that the pressure for CSR is too big and the risks too high with ignoring these issues. The pressure for taking on a CSR strategy can come from different interests; non-governmental organizations have for the last decades pressured industries and firms to take on CSR.⁹ Cementa today have a short strategy for CSR and the main paragraph reads as follows: "We strive to always be open and transparent and maintain a positive dialogue with neighboring communities. To strengthen and develop local communities, we support local events and activities, preferably with a focus on young people."¹⁰ Cementa also mentions cooperation with non-governmental organizations and that they conduct their business by "sound business principles" and work according to UN's sustainability goals.¹¹

Environment and sustainability in the cement industry

The Swedish cement producers were not engaged in environmental issues before the mid-1970s. Nothing regarding environment, nature and climate is noticeable in the companies' documents. The lack of attention on the environmental issues from the cement industry have resulted in several clashes with environmental groups and the public from the 1970s and onwards. Here follows a recapitulation of some of these situations and an account for how the cement monopolist, Cementa, have taken on the sustainability issues.

Local conflict about a new quarry -1974

In 1974 the cement industry clashed with prevention of nature for the first time. Cementa were into a structural transformation and were trying to coordinate the production to fewer production units. The factory in Slite, Gotland, was one of the factories that was considered to be suitable for growing and for taking on more exports since the factory was located close to a big harbour. In order to realize the new plans a

⁸ Lee (2008), p. 57

⁹ Egels-Zandén (2010), p. 21-23

¹⁰ <https://www.cementa.se/en/sustainability-0>

¹¹ <https://www.cementa.se/en/sustainability-0>



new limestone depot had to be taken into use. The cement company, Cementa, planned for a new quarry in File Hajdar, a land area that the cement company had owned for decades. File Hajdar is located at larger distance from the factory than the previous quarries and the limestone would be transported to the factory. Cementa needed permission from the County Administrative Board (Länsstyrelsen) to open the quarry. Other authorities and organizations would be consulted, and the company needed to do an inspection of the nature in the area. The County Administrative Board forecasted that there would be a conflict about the plans for a quarry in File Hajdar.

The forecast was correct, and the conflict came into bright light at a public meeting arranged in the municipality. Representatives from nature organizations claimed that the quarry could not be in File Hajdar due to valuable nature and that it was uncertain how the quarry would affect the ground water. Cementa argued that there was no alternative to a new quarry, and that the activities in the cement factory would diminish without the quarry and in the long term the factory would close.

The debate continued in the media and the local society after the public meeting. The conflict was clear; environmental care stood against development and jobs. The public debate affected the authorities, and they performed an investigation about how the water would be affected by the quarry. Cementa had good contacts with the government, this was soon after the establishment of the monopoly where the government was involved and part of the aim with the merger was the rationalization of the industry, and Cementa made use of the good terms. Cementa pressured the government, they told the government that they needed help with the permission for the quarry in File Hajdar otherwise the factory was in danger and that the prices would need to be changed.

The formal decision was made by the County Administrative Board, the board was divided, but Cementa got the permission to start the quarry in December 1975. The tension between different interests was not dealt with and when Cementa wrote about the issue in their own magazine, they did not even acknowledge that there had been a conflict. The conflict in the local society and between the company and different organizations were lurking during the next decades and there were reminders about the issues in the public debate now and then, but the next big conflict did not flare up until and half decade later.

Conflict with Greenpeace - 2001

In 2001 Cementa started to burn tires and hazardous waste as replacement to coal and oil in the factory in Slite. At first Cementa's own waste and plastic, bought from a domestic company, was used, but the company also had plans for buying waste from other countries and using household garbage from the local community. Since the burning of hazardous waste was made for a trial period, there was no need for permission from the Swedish Environmental Court (Miljödomstolen). The environmental organization, Greenpeace, reacted on the burning of waste and sent a critical letter to Cementa. Greenpeace and representatives from Cementa met and discussed the issues, but without any result. Two weeks after the meeting between Greenpeace and Cementa, activists from Greenpeace illegally entered the factory. Greenpeace stole some plastic bales, that they planned to bring with them to Stockholm and exhibit on an environmental meeting. More activists joined the protest and the action continued for two weeks. Greenpeace tried to reach out to Cementa, but without response. Greenpeace found that there was waste that had been imported illegally. Cementa defended themselves against the criticism by publishing an article in the local newspaper. The company argued that they had diminished their need for non-renewable fossil fuels and that they had made investments for the environment and that the plant in Slite was one of the most environmentally friendly plants for cement production. Cementa concluded that they and Greenpeace have different opinions concerning what good environmental choices were.



The direct conflict was dissolved through a meeting between Greenpeace and Cementa. Cementa agreed to look over the process of burning waste and a working group with representatives from Cementa and Greenpeace was set up to continue to discuss the waste problem. The working group with representatives from Greenpeace and Cementa only met once. It was dissolved since Cementa decided to make a criminal complaint and demand damages from Greenpeace. The burning of waste in the factory in Slite continued.

Sustainability on the agenda

In the conflict with Greenpeace, Cementa argued that they had a different view of interpreting the sustainability issues and that is also significant for how Cementa has taken on the sustainability issues. The company argue that it is better that they produce cement than that other producers in other parts of world produce cement, since their production is dirtier and cause more harm. Cementa is also arguing that the product cement must be set in a life-cycle perspective. The life-cycle perspective means that the time that the product is in use must be taken into the calculation as well as the fact that concrete binds and takes up carbon dioxide. Cementa has also set up a goal that the factory in Slite would be carbon-dioxide neutral in 2030. This will be done through a change of fuel (to renewable energy), use of other raw materials (the limestone could in part be replaced by other materials, especially waste products from other industries) and by Carbon capture and storage, CCS (the plan is that a facility will be built where the carbon could be stored, the Norwegian cement producer Norcem, that are also an affiliated company to HeidelbergCement, is the first cement factory setting up this kind of the facility). The process of burning the limestone in the kilns accounts for more than half of the emissions and therefor it is necessary to include CCS in order to reach the goals, however the technique is still in the testing phase and only done on a small scale.¹²

The background to the engagement in environmental and sustainability is not especially old in the Swedish Cement industry. As mentioned above, there were no interest in these issues before mid-1970s and then it was not by an initiative by Cementa. During the 1980s the environmental issues started to show in Cementa's internal magazine. The focus was on how the products from the cement and limestone industry could help improve the environment. In the beginning of the 2000s, Cementa started to prepare for going into a process of environmental certification and because of that the company prioritized several parts of making the production more sustainable; recycling and taking in rest products from other industries in the product, eg. binding of carbon dioxide.

In 2010 Cementa was eager to show what kind of improvements they had done concerning the environment and the sustainability, and that they took on a sustainability perspective. A radical shift had been made, and the industry now acknowledged that their products could be harmful for the environment. However, there was no doubt that the production in Sweden was much better for the environment then the production in other countries. Cementa did not use hard facts for backing this up instead it seems that they regarded it as indisputable facts. Even if the cement industry acknowledged their harm for the environment, they were also keen on highlighting their products and their part in both society and as helping to improve the environment.

The cement factory in Slite has been rebuilt several times after the modernization in the 1970s and the factory is often displayed as improvement project for the environment. There has been a lot of testing about how to reduce and clean the emissions from the factory. Experimentation with the fuel used in the kilns are performed and the plan is to increase the use of alternative energy sources. The use of waste as fuel is also

¹² Karlsson, Toktarova, Rootzén and Odenberger (2020), p. 19



part of the strategy, for example burning of old tires gives a lot of energy and there is no other way to recycle the tires. Cementa argue that they therefore contribute to a better use of global resources.¹³

It is indisputable that the cement industry is one of the industries that have the biggest emissions of carbon dioxide, no matter how you calculate the emission. When the global cement industry set up a project plan for reaching sustainability in 2002 this was also of most important issues. In the report it is also stated that the cement industry does not have the best reputation when it comes to these issues.¹⁴ Even though the emissions are well-known, Cementa profiles itself as a sustainable company. Cementa claims that their cement factory in Slite is world leading in replacing fossil fuels, which allows both the company and the customers to reduce their environmental impact. The vision about being carbon dioxide neutral in 2030 also plays into this narrative.

The conflict of 2021 and 2022

Even though Cementa had implanted sustainability and highlighted sustainability in their PR the sustainability conflicts were not over. On regular basis the permits for industrial activities and for continuing and enlarging the limestone quarries. Cementa applied for new permissions in Land and Environment Court. Cementa got the permission, but it was appealed and in July 2021 the decision arrived that no permission could be given. The Land and Environment Court of Appeal came to the conclusion that the material and the investigations made by the cement company Cementa was not as embracing and done with the right measurements. The main question was how the outtake of limestone in the large quarry, File Hajdar would affect the ground water in the surrounding area.

After the decision a public debate occurred, where different interests argued for their sake. Before the local jobs and regional development had been opposed to environmental issues, but this time the argument was for the national level. The Swedish construction sector claimed that the whole construction industry in Sweden were at risk if Cementa could not continue to produce cement. The cement industry argued that it was not possible to import cement and that the cement industry in other countries were not as sustainable as the cement produced in Sweden (import would not be in line with the Swedish environmental goals). The Swedish government therefor decided to adjust the Swedish environmental legislation so that the limestone quarries had special clause in the Swedish Environmental Code. The Swedish parliament approved of the legislation and that meant that the cement plant in Slite could continue to quarry limestone and thereby produce cement. Since the permit process is complicated this means that Cementa can continue to quarry limestone until 31 December 2022 and after that a new permit is needed.

¹³ Cementa 1997: 2, p. 7

¹⁴ WBCSD. Towards a Sustainable Cement Industry (2002)



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References:

Bizvibe. <https://blog.bizvibe.com/blog/top-10-cement-companies-world>

Cementa. <https://www.cementa.se/sv/slite>

Cementa. <https://www.cementa.se/en/sustainability-0>

Dahlström, M., 2020. The foundations of cooperation: building cartels in the Nordic cement industry and beyond, 1890-1947. *The Scandinavian economic history review*, 68(3), pp.239–253.

Egels-Zandén, N, 2010. *Managing responsibilities: The formation of Swedish MNC's firm-society policies and practices*. Göteborg: BAS.

Investopia. <https://www.investopedia.com/terms/c/corp-social-responsibility.asp>

Karlsson, Toktarova, Rootzén and Odenberger. *Technical roadmap. Cement Industry*. Mistra Carbon Exit. 2020

Lee, M. (2008). A review of the theories of corporate social responsibility: Its evolutionary path and the road ahead. *International Journal of Management Reviews : IJMR*, 10(1), 53-73.

Sveriges natur. <https://www.sverigesnatur.org/aktuellt/de-slappte-ut-mest-koldioxid-2020/>

World Business Council for Sustainable Development (WBCSD). *Towards a Sustainable Cement Industry*. 2002.

<https://www.wbcd.org/Sector-Projects/Cement-Sustainability-Initiative/Resources/Toward-a-Sustainable-Cement-Industry>